

VOLUME I - ATTACHMENTS A, B AND C

**FINAL ENVIRONMENTAL INVESTIGATION REPORT ADDENDUM
REMEDIAL ACTION REPORT**

**Johnson Controls Battery Group, Inc.
700 North Broad Street
Middletown, Delaware 19709**

Submitted to:

State of Delaware
Department of Natural Resources and Environmental Control
Division of Air & Waste Management
Hazardous Waste Management Branch
P.O. Box 1401, 89 Kings Highway
Dover, Delaware 19903

RE: DED 002353092; File 10, Code 15

Montgomery Watson
335 Phoenixville Pike
Malvern, Pennsylvania 19355

**Prepared
June 1999**

**Revised
July 2000**

CERTIFICATION

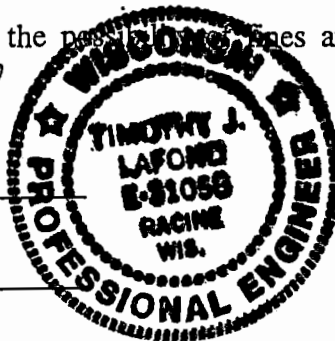
I certify that the information contained in or accompanying this Addendum to the Final Environmental Investigation Report is true, accurate and complete.

As to those portions of this submittal for which I cannot personally verify their accuracy, I certify under penalty of law that this Addendum to the Final Environmental Investigation Report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true accurate, and complete. I am aware that there are significant penalties for submitting false information, including the payment of fines and imprisonment for knowing violations.

Signature: _____

Name: Timothy J. Lafond, P.E

Title: Environmental Relations Manager



Response to Comments
Environmental Investigation Report Addendum: Remedial Action Report, July 1999
Johnson Controls Battery Group, Inc. (JCBGI)
Middletown, Delaware

1. *Section 2.1.1.1, Correlation Study, page 2-1 - The Final Remedial Action Work Plan (Section 4.4.5) stated that the acceptance criteria would be adjusted as QC sample data was reported. Provide details of adjustments and documentation.*

Response: No adjustments were made to the XRF action level of 314 ppm. Because the fixed-laboratory data was consistently below the XRF data, and both sets of data were well below the action levels, the XRF action level was determined to be sufficiently protective, and no adjustments were necessary.

2. *Section 2.1.1.1, Correlation Study, page 2-1 -A comparison of the initial lab/XRF data with that generated during the project showed that the percent difference between the lab and XRF data obtained during the project was much higher compared with the initial data. The project XRF data was found to range from 0.6 to 13.9 times the corresponding lab data, while during the initial study, the XRF data ranged from 0.7 to 1.2 times the corresponding lab data. Provide rationale for differences.*

Response: The initial data from the correlation study was contained lead in the 400 to 600 mg/kg range while the confirmation data from the project contained lead in the 0 to 100 kg/kg range. Because site specific standards in the 400 to 600 mg/kg range were used to calibrate the XRF unit during the project so that the greatest accuracy would be near the agreed to 400 mg/kg action level, a greater degree of difference between the XRF and fixed-laboratory data at lower concentrations would be expected. That is to say the farther the data is out of the calibration range, the greater the expected difference is expected to be.

3. *Section 2.1.1.1, Correlation Study, page 2 - During the project, the lab data exceeded the XRF data in 3 of 14 trials, while in the initial study, the lab data exceeded the XRF data in 13 of 15 trials. Provide rationale for differences*

Response: This is likely due to heterogeneity of metals in the soil. Additionally, the majority of the lead concentrations were below the calibration range used during the initial study. The fact that such a high percentage of the project XRF data was above the associated fixed-laboratory data suggests that the XRF data was biased high, and therefore an over-estimation of the true lead concentrations. As a result, using the XRF data provided a conservative and more protective indication of lead concentrations in the confirmation samples.

4. *Section 2.1.1.1, Correlation Study, page 2-1 and else where. -It appears that three labs were utilized (Pace, Core, and Artesian) during the project yet only one is mentioned in the text. Identify in the corresponding sections which analytical service was utilized.*

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Response: The text will be revised as requested.

5. *Section 2.1.2, Sample Identification, page 2-2 - Include a summary of the results of these water samples in the opening letter.*

Response: A table summarizing the water samples will be provided.

6. *Section 2.1.4, Confirmatory Samples, 2-3 - Fourteen laboratory samples corresponded with some of the XRF samples. What was the correlation between these readings and how does this correlation compare with the original correlation work?*

Response: The correlation between the XRF and fixed-laboratory data was poor as indicated in Comment No. 4. However, the XRF data was consistently biased high, indicating that XRF provided a conservative and more protective indication of lead concentrations in the confirmation samples.

7. *Section 2.1.4, Confirmatory Samples, 2nd paragraph, 4th sentence, page 2-3 - Typo, "the".*

Response: The text will be revised as noted.

8. *Section 2.1.4, Confirmatory Samples, page 2-3 - Clarify if the soil samples were homogenized prior to shipment to the off-site laboratory?*

Response: The text will be revised to indicate that samples were homogenized prior to shipment to the laboratory.

9. *Section 2.1.5, Field Quality Assurance/Quality Control, page 2-3 - The decontamination procedure detailed in the Final Remedial Action Work Plan (Section 3.3.1) was not the one followed during the work activities. Provide rationale.*

Response: The text mistakenly omitted that a water rinse was conducted between the Alconox wash and the nitric acid rinse. The text will be corrected to reflect the actual procedures used.

10. *Section 2.1.5, Field Quality Assurance/Quality Control, page 2-3 - Include a discussion regarding the disposal of used decontamination liquids in the report.*

Response: The decontamination liquids were transferred to JCBGI's permitted wastewater treatment plant, where they were handled in accordance with their existing permit.

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11. *Section 2.1.7, Field Quality Assurance/Quality Control, page 2-4 - What was/were the site specific standard(s) utilized. The reviewer was not able to evaluate the standard concentration if the site specific standard is not provided. Many of Appendix B standard data results do not appear to be within the 20% required. In this event, more standard readings should have occurred to calibrate the instrument. Examples include 11/24/98 standard 11:07, 466.92; 11:09, 218.93; 11:11, 360.06. How does this non-conformance data effect the usability of the subsequent data?*

Response: The site-specific standard used contained 386 mg/kg of lead. Where the standard analyses were not within the required $\pm 20\%$ range, the XRF unit was recalibrated.

In the example given in the Agency's comment above, the standard was analyzed three times, and the readings were averaged in accordance with Spectrace 9000 protocol. This average result, 348.64 mg/kg, was 9.7% different than the standard concentration; within the 20% limit.

12. *Section 2.1.7, Field Quality Assurance/Quality Control, page 2-4 - The Table should be titled or numbered for ready reference.*

Response: The table will be numbered as requested.

13. *Section 2.1.7, page 2-5, 3rd paragraph, 2nd sentence - It is stated that it "appears" the samples were analyzed within required holding times and the analytical data is within acceptable limits. Were the sample data acceptable or not in reference to these two criteria?*

Response: The data were acceptable with respect to holding times and matrix spike recoveries as indicated in Attachment C to the Addendum. The text will be modified accordingly.

14. *Section 2.1.7, Field Quality Assurance/Quality Control, page 2-5, 3rd paragraph, last sentence - Clarify the term "use" in the last sentence.*

Response: The last sentence of the paragraph will be changed to say "The fixed laboratory data was of known and acceptable quality as qualified based on the laboratory-established acceptance limits."

15. *Section 2.4.1, Area C, Delineation, page 2-8. - Reference where the data for the Area C delineation via real-time XRF is located within this submittal.*

Response: The contractor made a decision to excavate this localized area using direct, in-situ XRF readings to guide the excavation. However these readings were

Response to Comments
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not recorded in field logbook, and are therefore unavailable. JCBGI is in the process of addressing the issue with their subcontractor. The attached letter outlines JCBGI's strategy for resolving this issue.

16. *Section 2.5.1, Area D: Soft Shoulder Along North Broad Street – Delineation* This section describes the delineation of soils in the Area D excavation zone. JCBGI's contractor damaged and replaced a twelve (12) inch drain pipe during remedial activities in this area. During the replacement of the drain pipe, a white precipitate believed to be lead oxide residue was discovered in this area. The soils containing the white precipitate were excavated and treated for off-site disposal. JCBGI should provide a summary of their historical operating practices that explains how the white precipitate/lead oxide residue was conveyed to this location. Provide information clarifying if this pipe at any time drained process waters that would include lead oxide residues. This area should be addressed as an additional area of concern and Johnson Controls should consider the need for further investigation.

Response: The text needs to be modified to clearly relate the activities referenced in this comment. They were as follows:

As JCBGI's contractor was excavating the delineated area D2, a 12-inch corrugated steel storm sewer pipe (designated as "Leg 4" on Figure 1-3 of the report) was encountered at 6 inches below ground surface. The pipe was found to be in poor condition. This storm sewer pipe was removed and replaced.

A separate section of abandoned 4-inch ADS line was encountered in area D2 at 6 inches below ground surface. The line ran parallel to the storm sewer pipe for approximately 25 feet, and then angled off at 45 degrees and ran north for approximately 70 feet where it terminated. The pipe was observed to be in good condition. The attached figure (a modified version of Figure 2-4 from the report) illustrates the location of the 4-inch line. A figure will be added to the report to illustrate the pipeline location. This 4-inch line was found to contain the white precipitate believed to be lead oxide residue. However, the residue was present inside the pipe, not in the surrounding soils.

JCBGI has reviewed their historical records to identify the origin of this drain line. Based on this review, the line is likely an abandoned section of a former process sewer that discharged to the POTW. Because this line was located in remedial area D2, which has already undergone extensive remediation, the drain pipe area should be considered part of Area D2, not a separate area of concern. JCBGI proposes that additional samples be collected from native soils every 20 feet along the former drain pipe. The sampling plan is outlined in the attached letter.

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17. *Section 2.5.1, Area D, Delineation, page 2-9. - A review of the Work Plan did not reveal an intention to use XRF values +/- 10%.*

Response: As indicated in the comment, this reference to the accuracy of the XRF unit is irrelevant to the delineation methods outlined in the Workplan. The text will be revised to eliminate the statement referenced above.

Rather than vertically delineate the location beneath the 12-inch depth, in situ XRF readings were used to guide the excavation. Both EPA and DNREC should have been notified prior to implementation of these changes, however it was not brought to JCBGI's or Montgomery Watson's attention until the project was complete. The attached letter outlines JCBGI's strategy for resolving this issue

18. *Section 2.5.1, Area D, Delineation, page 2-9 - There is a no subsequent sample below the pipe to determine that the soils were below the 314 ppm lead criteria. Confirmatory number CSD2-A3-8, 1/8/99 refers to a sample depth of 0.66 feet. Explain why no additional samples were taken and analyzed below this depth.*

Response: As indicated in the response to Comment 16. The document did not accurately describe the circumstances surrounding the pipe(s). Response to Comment 16 and the attached letter addresses JCBGI's proposed strategy for addressing this issue.

No sample was collected below sample CSD2-A3-8 because the result was below the 314 mg/kg XRF action level.

19. *Section 2.6.1, Area E, Delineation, page 2-9. - The reference table uses 860 ppm, not 859 ppm. Adjust accordingly.*

Response: The figure will be revised according

20. *Section 2.6.1, Area E, Delineation, page 2-11. - It is stated that no vertical delineation samples were collected at Area E in accordance with the work plan. Section 2.3.7.5, number 2 of the Work Plan states "vertical extent will be delineated in 6 inch increments until the extent of impacted soil has been reached." Clarify why no vertical delineation was conducted at Area E, when 5 out of the 6 delineation results at 0.5 foot sample depth interval were above the 400 ppm criteria.*

Response: The procedures used for vertical delineation were consistent with those presented in the Remedial Action Workplan Addendum dated October 19, 1998.

21. *Section 2.6.1, Area E, Delineation, page 2-11. - Reference where the data for the Area E delineation via real-time XRF is located within this submittal.*

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Middletown, Delaware

Response: As indicated in the response to Comment No. 15, JCBGI is addressing the fact that the real-time data was not recorded with the contractor. The attached letter outlines the strategy for resolving this issue.

22. *Section 2.8.1, Excavated Soil/Sediment Treatment and Disposal, Segregation, page 2-13 . - Clarify if the delineation samples were used for segregation purposes or if additional sampling occurred. If so, what was the frequency of sampling and were any confirmatory samples analyzed? Also reference the section where results can be found.*

Response: Each excavated bucket of soil was screened using the XRF unit. Those samples with XRF readings above 1000 mg/kg were treated prior to disposal. Stockpiled soil (both treated and untreated) was sampled at a rate of 1 sample per 100 cubic yards and analyzed for TCLP lead. The data is summarized in Table 2-5 and contained in Appendix C.

23. *Section 2.8.2, Excavated Soil/Sediment Treatment and Disposal, Treatment, page 2-13. - Document that Core Laboratory conducted the analytical work.*

Response: The text will be revised accordingly.

24. *Section 2.8.3.2 Excavated Soil/Sediment Treatment and Disposal, Verification, page 2-15 . - It appears that the statement "Laboratory results verified that both the untreated and treated soils were nonhazardous." is not valid. According to Appendix C3 CORE Laboratory results dated 11/10/98 exceeded the 40 CFR 261 TCLP lead criterion of 5.0 mg/L for the untreated soils. Lead results for the characterization for landfill disposal were detected at 16.6 mg/L and 56.3 mg/L. Clarify and address this issue in this section.*

Response: The text will clarify that the data referenced in the comment was pretreatment data collected before the treatability study.

25. *Section 2.8.3.2 Excavated Soil/Sediment Treatment and Disposal, Verification, page 2-15. - It is stated that analyzed results are summarized in Table 2-5. TCLP lead results are the only results summarized in Table 2-5. Summarize all detected results including TPH, and TCLP results for metals, pesticides, herbicides, volatiles, semivolatiles and PCBs in Table 2-5.*

Response: The table will be revised as requested.

26. *Section 2.10.2, Underground Conveyance System Clean-Out, page 2-17 . - Indicate that Artesian Lab conducted the analysis and reference the section where data results can be found.*

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Response: The text will be revised accordingly

27. *Section 2.11.1, Area D Drainage Pipe Replacement, page 2-18. - Clarify whether the entire pipe run or only a portion of the run was replaced. How much of the pipe was replaced?*

Response: The entire length of the 12-inch storm sewer pipe was replaced. The entire section of the 4-inch ADS line was removed. See response to Comment No. 16.

28. *Section 2.11.1 - Additional Field Activities - Area D Drainage Pipe Replacement Provide information regarding the disposal of the replaced drainage pipe and associated tile field from Area D.*

Response: The 12-inch pipe was disposed of along with the untreated-soil at BFI landfill. The 4-inch pipe was cut into small sections, stabilized with the along with the soil requiring treatment, and disposed of at BFI landfill.

29. *{No Comment No. 29 was provided}*

30. *Section 2.11 - Additional Field Activities Include discussion of all additional field activities (i.e.; pressure washing the loading dock at Area B and repairing the rain gutter system during the roof cleaning activities.)*

Response: A description of additional field activities will be added to the text.

31. *Section 2.11.2, Rail Spur Removal, page 2-18. - Reference where the data on the XRF results showing the depth of contamination is located.*

Response: The data for soil beneath the rail spur is the Area B confirmation data.

32. *Section 2.11.2, Rail Spur Removal, page 2-18. - Were the railroad ties preserved with creosote or other wood preserving chemicals?*

Response: There is no data available to assess whether this railroad ties were preserved with chemicals.

33. *Section 2 General Comment. - A comparison of the estimated number of samples to be taken and those actually taken during the project yielded the information found in the table below. Explain why the numbers of XRF samples varied in Areas A and D2. Also how much material was actually excavated from each of the area*

Response: The numbers of samples presented in the workplan were estimates based on historical RFI data. The actual number of samples were based on existing

Response to Comments
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Middletown, Delaware

field conditions encountered during the project. The quantity of material excavated from each area is as follows:

Area	XRF		Lab		Cubic Yards	
	Plan	Actual	Plan	Actual	Plan	Actual
A	32	19	4	2	450	270
B	10	6	1	1	250	300
C	10	7	1	1	300	95
D1	5	3	1	1	7	550 total
D2	16	70	2	8	350	
E	4	8	1	7	7	58
F	0	0	0	0	<1	<1

34. *Section 3.0 Conclusion, 5th paragraph. - The XRF unit utilized an action level of 314 mg/kg, not 400 mg/kg. Clarify action level.*

Response: The text will be revised to clarify the action levels.

35. *Table 2-3, Page 2 of 5, Area D2. - SSD2-A3NE12 had a concentration of 8558 ppm. Where are the results of the sampling below this point?*

Response: No delineation sample was collected beneath sample SSD2-A3NE12 because contractor made a decision to excavate this localized area using direct, in-situ XRF readings to guide the excavation. The resulting depth of the excavation in this confirmation grid cell was variable. In accordance with the workplan, the confirmation sample was collected at the center of the 20 x 20 foot grid cell, which occurred at a depth of approximately 8 inches below grade. Because the resulting lead concentration was 89 mg/kg (below the 314 mg/kg XRF action level), the grid cell was considered to be successfully remediated.

JCBGI realizes that the deviation from the workplan, and the subsequent lack of documentation, is a concern, and is addressing the issue with the contractor. The attached letter outlines the strategy for resolving the issue.

36. *Table 2-3, Page 3 of 5, Area D2. - There is no depth for sample SSD2-D2NE included in the sample label.*

Response: The depth of the sample was 6 inches. The table will be revised accordingly.

Response to Comments
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Middletown, Delaware

37. *Table 2-3, Page 5 of 5, Area E. - Delineation Samples were all above the 314 mg/kg value and were limited to the 0.5 foot depth. Justify the limited sampling in this area.*

Response: The contractor made a decision to excavate the area using direct, in-situ XRF readings to guide the excavation. Though this method is a deviation from the Workplan, it is a logical and effective means of removing the horizontal and vertical extents of lead-impacted soil in the area. Both EPA and DNREC should have been notified prior to implementation of these changes, however it was not brought to JCBGI's or Montgomery Watson's attention until the project was complete. The attached letter outlines JCBGI's strategy for resolving the issue.

Enclosure

Final Administrative Order on Consent (Order)

Johnson Controls Battery Group, Inc.

Middletown, De

Response to Comments and Proposed Additional Confirmation Sampling

Environmental Investigation Report Addendum: Remedial Action Report

EPA Docket No. RCRA-3-018-AM

EPA Comment Number 10

Section 2.1.5, Field Assurance/Quality Control, Page 2-3 - Include a discussion regarding the disposal of used decontamination liquids in the report.

JCBGI's Response:

The decontamination liquids were transferred to JCBGI's permitted wastewater treatment plant, where they were handled in accordance with their existing permit.

EPA Comment to JCBGI's Response:

Response is acceptable. Ensure that the response clarification is added to the final text.

EPA Comment Number 20

Section 2.6.1, Area E, Delineation, page 2-11. - It is stated that no vertical delineation samples were collected at Area E in accordance with the work plan. Section 2.3.7.5, number 2 of the Work Plan states "vertical extent will be delineated in 6 inch increments until the extent of impacted soil has been reached." Please clarify why no vertical delineation was conducted at Area E, when 5 out of the 6 delineation results at 0.5 foot sample depth interval were above the 400 ppm criteria.

JCBGI's Response:

The procedures used for vertical delineation were consistent with those presented in the Remedial Action Work Plan Addendum, dated October 19, 1998.

EPA Comment to JCBGI's Response:

Response is unacceptable. Clarify what section of the Remedial Action Work Plan is the vertical delineation for Area E discussed. Section 2.3.2.5, second paragraph, in the Final Remedial Action Work Plan dated September 1998 states that vertical extent will be delineated in 6 inch

increments until the extent of impacted soil has been reached. This clearly was not done in the investigation.

ATTACHMENT A

XRF ACTION LEVEL CALCULATIONS

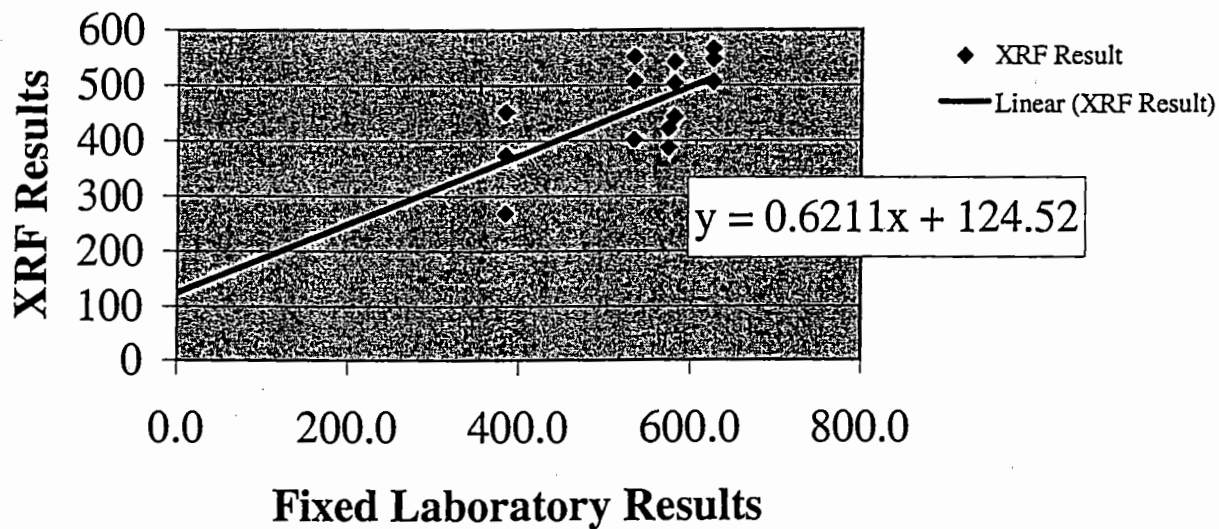
As requested by USEPA, this attachment provides the calculations of the field XRF action level corresponding to and SW-846 method 6010a lead concentration of 400 mg/kg.

In order to determine a protective field screening value, five representative, site-specific soil samples were collected and analyzed for lead using both XRF and SW-846 method 6010a methods. The XRF action level was determined by performing a regression analysis of the two data sets, and developing a two-sided, 90th percent confidence band around the regression line. The steps and calculations are presented in the following pages.

Step 1: Plot XRF screening results against the mean fixed laboratory results. Determine the equation of the regression line using the least squares method (internal spreadsheet function).

x Mean Fixed Laboratory Result	y XRF Result
534.0	551
534.0	507
534.0	402
625.3	506
625.3	547
625.3	566
573.3	423
573.3	422
573.3	388
580.3	443
580.3	503
580.3	542
384.3	452
384.3	268
384.3	374

XRF vs Fixed Laboratory Results



Step 2: Calculate the lower and upper confidence limits (LCL and UCL) on the regression line using the equations outlined below.

x_k	\hat{y}_k	LCL _{0.10}	UCL _{0.10}	$S_{\hat{y}_k}$
	Regression Curve	Confidence Bound	Confidence Bound	
390	366.76	304.68	428.84	35.05
400	372.97	314.05	431.90	33.27
410	379.19	323.35	435.02	31.53
420	385.40	332.59	438.21	29.82
430	391.61	341.74	441.48	28.16
440	397.82	350.80	444.84	26.55
450	404.03	359.74	448.32	25.01
460	410.24	368.54	451.94	23.54
470	416.45	377.18	455.72	22.17
480	422.66	385.62	459.70	20.91
490	428.88	393.83	463.92	19.79
500	435.09	401.76	468.41	18.82
510	441.30	409.36	473.23	18.03
520	447.51	416.60	478.41	17.45
530	453.72	423.44	484.00	17.10
540	459.93	429.85	490.02	16.99
550	466.14	435.81	496.47	17.12
560	472.35	441.36	503.35	17.50
570	478.56	446.50	510.63	18.11
580	484.78	451.28	518.27	18.91
590	490.99	455.74	526.23	19.90
600	497.20	459.93	534.46	21.04
610	503.41	463.89	542.93	22.31
620	509.62	467.65	551.59	23.70

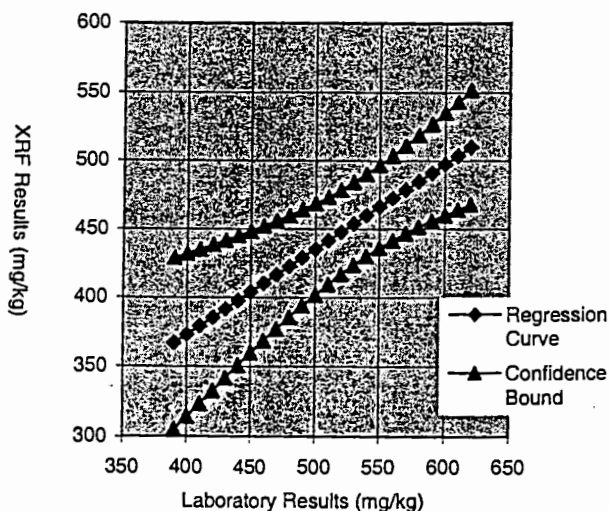
$$s_{\hat{y}_k} = \sqrt{s^2 \left(\frac{1}{n} + \frac{(x_k - \bar{x})^2}{\sum (x_i - \bar{x})^2} \right)}$$

$$\hat{y}_k = 0.621x_k + 124.52$$

$$\text{LCL}_{0.10} = t_{(1-\alpha/2, n-2)} S_{\hat{y}_k} - \hat{y}_k$$

$$\text{UCL}_{0.10} = t_{(1-\alpha/2, n-2)} S_{\hat{y}_k} + \hat{y}_k$$

s = Standard Deviation	65.79
s^2	4328.71
n = Number of Samples	15
$\sum (x_i - \bar{x})^2$	102859.07
\bar{x} = Mean XRF	539.47
α = Type I Error Rate	0.1
$t_{(1-\alpha/2, n-2)}$	1.771
$s_{\hat{y}_k}$ = Standard Error	



The regression curve and its 90% confidence interval are plotted in the graph to the left. The lower confidence bound can be regarded as a lower, one-sided, 95% confidence bound for the mean value of the XRF result for a given mean laboratory result. This lower confidence bound intersects a mean laboratory result of 400 mg/kg at an XRF result of 314 mg/kg. Thus we are 95% confident that an XRF result lower than 314 mg/kg would correspond to a lab result of less than the 400 mg/kg cleanup goal.

ATTACHMENT B
REMEDIAL ACTION REPORT

PREPARED BY
ENTACT
JUNE 1999

REVISED BY
ENTACT
JULY 2000

REMEDIAL ACTION REPORT

Johnson Controls Battery Group, Inc. Facility
Middletown, Delaware

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1.0 INTRODUCTION

This document presents the Final Report of remedial activities performed between October 1998 and January 1999 at the Johnson Controls Battery Group, Incorporated (JCBGI) Facility in Middletown, Delaware (Site). The remedial activities described in this report were performed in response to United States Environmental Protection Agency (USEPA) recommendations that the lead-impacted soil identified in the *Draft Environmental Investigation Report (EIR)*, dated February 6, 1997, be removed from the site and that confirmation sampling be conducted. In addition, USEPA recommended that the Facility roofs, gutters, and downspouts be decontaminated to remove the buildup of lead-impacted sediments that may be present.

ENTACT was retained by JCBGI to meet the remedial action objectives established in the approved *Final Remedial Action Work Plan* (1998) developed by Montgomery Watson of Malvern, Pennsylvania. These objectives include:

- Remove, and if necessary, treat lead-impacted soils delineated in previous Site investigations and defined in the approved *Final Remedial Action Work Plan* (1998) developed by Montgomery Watson of Malvern, Pennsylvania. These areas are identified in Figure 1-2.
- Decontaminate the facility roofs and structures associated with the on-site stormwater conveyance system. The stormwater conveyance system is illustrated in Figure 1-3.

The *Final Remedial Action Report* provides a brief history of the site, a description of the field methodologies used during the remedial action, and a summary of the work completed to meet the Remedial Action Objectives.

1.1 SITE DESCRIPTION

The JCBGI facility is a 16.2-acre site, located at 700 North Broad Street, Middletown, Delaware in New Castle County, just north of the town center and south of the intersection of North Broad Street and U.S. Route 301 (Figure 1-1). Access to the plant is from the east side, adjacent to North Broad Street. To the northwest, the site is bordered by a railway and is primarily agricultural. To the west, land use has historically been agricultural, but is currently transitioning toward commercial usage. The area immediately north of the facility is commercial. The site is immediately bordered to the south by Napa Auto Parts and other commercial

facilities. Further south of the site, the area is primarily residential. A small strip mall was recently constructed on the east side of North Broad Street.

Area topography slopes north and east toward Dove Nest Branch, a tributary of Drawyer Creek approximately 2,000 feet north of the facility. Drawyer Creek flows east to the Appoquinimink River, which in turn flows into the Delaware River.

During 1993, JCBGI expanded its facility, constructing warehouses and expanding operations. The present facility layout is depicted in Figure 1-2. The expansion included reconfiguring the stormwater drainage system and constructing two stormwater sedimentation basins, as required by the State of Delaware, to manage stormwater. The new stormwater drainage system collects surface run-off from the roofs of the buildings and the paved areas via a system of catch basins and underground drains leading to the two sedimentation basins. The basins drain into the municipal stormwater system (located along North Broad Street), which conveys stormwater to Dove Nest Branch.

1.2 SITE HISTORY

The JCBGI facility has been engaged in the manufacture of lead-acid batteries since 1961. The site was previously owned and operated by Globe Union, Inc. until 1978, when it merged with Johnson Controls, Inc. Part of the industrial process at the facility involved the storage of hazardous waste for a time period greater than 90 days. As a result, JCBGI submitted a Notice of Hazardous Waste Activity to the USEPA on August 15, 1980, identifying the facility as a RCRA storage facility. On September 29, 1984, the Delaware Department of Natural Resources and Environmental Compliance (DNREC) issued a Part B permit allowing the facility to operate as a hazardous waste storage facility. In April 1993, as a result of changes in facility operations, JCBGI closed the hazardous waste storage pad under RCRA.

On March 11, 1994, USEPA issued an Administrative Consent Order (ACO) to JCBGI pursuant to §3013 of RCRA as amended in 42 USC §6934. The ACO reported 21 Findings of Fact, including references to a leak in the facility's baghouse collection system on March 8 and 9, 1983, during which 75 pounds of lead were released over a 10-hour period from facility stack No. 44. Based on results of subsequent sampling by both DNREC and USEPA, the ACO required that a RCRA Facility Investigation (RFI) be performed at the facility to fully characterize the extent and environmental impacts of the release. Findings from the RFI were summarized in the EIR.

1.3 1996 RCRA FACILITY INVESTIGATION

The RFI was conducted by James C. Anderson Associates, Inc. (JCA) of Mount Laurel, New Jersey in 1996. During the RFI, 181 soil samples were collected from 42 locations which are identified in Figure 1-2 with an "SS-" prefix designation. The soil samples collected during the RFI were analyzed for the eight RCRA metals and antimony. Analytical results were compared to USEPA Region III Risk-Based Concentrations (RBCs) for residential sites with the exception of lead which was assigned an action level of 400 mg/Kg. The 400 mg/Kg total lead action level was based on the USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12 because no RBC exists for lead.

The EIR indicated that soil lead concentrations were elevated lead levels at three principal areas of concern (Refer to Figure 1-2 for sampling locations):

Southwestern corner of the JCBGI property. Eighty-nine soil samples were collected in this unpaved corner area of the Site. Analytical results indicated lead concentrations exceeded the 400 mg/Kg remedial action level in six samples representing three locations (SS-6, SS-13, and SS-16).

East Side of Facility Building adjacent to the soft shoulder along North Broad Street. Sixty-one soil samples were collected in this unpaved area adjacent to the Site's eastern property line. Analytical results indicated lead concentrations exceeded the 400 mg/Kg remedial action level in 12 samples representing five locations (SS-42, SS-44, SS-45, SS-46, and SS-47).

Eight unpaved roof drain downspout discharge locations. Thirty-one soil samples were collected at these locations. Analytical results indicated lead concentrations exceeding the 400 mg/Kg remedial action level in 28 samples representing all eight locations (identified as SS-71, SS-72, SS-74, SS-75, SS-76, SS-77, SS-78, SS-79).

A full description of RFI activities and results is presented in the *Environmental Investigation Report (EIR)*, dated January 1999, prepared by JCA, and revised by Montgomery Watson.

1.4 REMEDIAL ACTION OBJECTIVES

The EIRs summary of soil sampling results indicated that total lead was the principal contaminant of concern in Site Soils. This finding was used to develop the Remedial Action Work Plan (Montgomery Watson, 1998) based on the EIR-established Site remedial action level of 400 mg/Kg for total lead. In October 1998, the USEPA, DNREC and JCBGI concurred that total lead was the contaminant of concern and that the regulatory action level driving remedial activities at the Site should be the level established during the 1997 EIR. Therefore, the remedial action level for site activities is:

Total Lead Remedial Action Level: 400 ppm

An X-Ray Fluorescence (XRF) instrument was used to quantify total lead concentrations during field delineation and confirmatory sampling. To ensure that the XRF instrument would accurately measure total lead concentrations above the 400 ppm action level, an XRF action level was established. The XRF total lead action level was determined by correlating measured analytical concentrations to measured XRF concentrations of five representative, site-specific soil samples. This correlation study is discussed in Section 2.1.1.1. The equivalent total lead XRF remedial action level was determined to be:

Total Lead XRF Remedial Action Level: 314 ppm

The total lead remedial action level was used to meet the following remedial action objectives:

- Delineate the lateral and vertical extent of Site soils exhibiting total lead concentrations in excess of the established 400 mg/Kg action level in areas of known soil impacts.
- Remediate, through excavation, treatment, and off-site disposal, delineated areas of Site soils containing total lead concentrations in excess of the 400 mg/Kg remedial action level.

1.5 REMEDIAL ACTION STRATEGY

1.5.1 Soil Remediation Areas

Concentration data compiled in the EIR was used to subdivide the areas of identified impacts into seven

remediation areas during the generation of the Remedial Action Work Plan (Montgomery Watson, 1998) and subsequent discussions with the USEPA and JCBGI. Each of these remediation areas are illustrated in Figure 1-2.

A specific remedial action strategy was developed for each soil remediation area based on the extent of known contamination, the size of the area, and the physical constraints (i.e., competent pavement or structure walls) present in the area. Each area and its associated strategy for remediation are briefly summarized below:

Area A: Southwestern Corner of the Site. This area was extensively investigated during the 1997 RFI. RFI analytical results indicated lead concentrations exceeded the 400 mg/Kg remedial action level in six samples from three locations (SS-6, SS-13, and SS-16) (Figure 1-2). However, analytical results did indicate that lead contamination did not extend below a depth of one foot below grade. The northern extent of lead contamination was delineated and soils exceeding the action level were removed as part of the remedial action. Access to the Conrail property along the south side of Area A, was not obtained during the remedial investigation and was not addressed during this remedial action.

Area B: Downspout Locations at the Southern Side of Main Building. This small unpaved area runs along the rail spur between the main facility building and the loading dock. RFI analytical results from sampling locations SS-71 and SS-72 indicated the soils contained lead at concentrations exceeding the remedial action level. The vertical extent of lead contamination was delineated, but no lateral delineation was performed because the area is bounded on all sides by physical constraints. Soils exceeding the action level were removed as part of the remedial action.

Area C: Downspout Locations at Southeastern Corner of Main Building. This small unpaved area abuts the southeast corner of the main facility building. RFI analytical results from sampling locations SS-75, SS-76, and SS-78 indicated the soils contained lead at concentrations exceeding the remedial action level. The vertical extent of lead contamination was delineated, but no lateral delineation was performed because the area is bounded on all sides by physical constraints. Soils exceeding the action level were removed as part of the remedial action.

Areas D1 & D2: Soft Shoulder along North Broad Street. This grassy area is east of the main facility entrance and adjacent to North Broad Street. (Figure 1-2). RFI analytical results from area sampling locations SS-42, SS-44, SS-45, SS-46, and SS-47 contained lead at concentrations exceeding the remedial action level. Remedial Subarea "D1" is located at the southern end of the D area, where RFI sample point SS-42 was advanced. Remedial Subarea "D2" includes the remaining area of concern along North Broad Street. Both areas were delineated laterally by collecting soil samples on grid nodes (D1 grid: 10' by 10'; D2 grid: 80' by 20') prior to remediation and confirmatory sampling. No vertical delineation was performed at the D1 subarea because RFI analytical results established that the extent of contamination did not extend beyond a depth of six inches below grade. Vertical delineation in the D2 subarea was performed at six-inch intervals at each of the sample points until soils containing total lead concentrations below the remedial action level were encountered.

Area E: Downspout at Northeastern Corner of the Main Facility. RFI analytical results from sampling location SS-79 in the unpaved northeast corner of the main facility (Figure 1-2) indicated that the soils below the downspout contained lead at concentrations exceeding the remedial action level. The lateral extent of surface contamination was delineated in a radial pattern extending northward using the

downspout (presumed source) as the center of the radius. RFI results suggested that soils at Area E had not been impacted below 6 inches and therefore the vertical extent was not delineated. Soils exceeding the action level was removed as part of the remedial action.

Area F: Surface Deposits Adjacent to Southeast Corner of former Salvage Melt Building. This area consists of a narrow, 2.5' by 20' strip of paved surface where sediment had accumulated (Figure 1-2). The sediment was removed with hand tools, the underlying pavement was decontaminated and resurfaced to eliminate any low-lying areas.

Lateral (sidewall) and vertical confirmatory samples were collected during the excavation of remedial areas A through E to confirm that the extent of lead-impacted soil has been removed. Lateral confirmatory samples were collected in regions where the remediation area is not constrained by physical constraints (i.e., pavement or facility buildings).

1.5.2 Roof and Stormwater Conveyance Decontamination

As part of the remedial action, High Efficiency Particulate Air (HEPA) vacuums, pressure washers, and hand scrubbing were used to decontaminate exterior roofs and the Site stormwater conveyance system piping to mitigate future surface migration of particulate lead. The decontamination effort proceeded in a logical progression starting from the lead-contaminated roofs to the downspouts, piping, and storm sewer lines that discharge runoff water into the sedimentary basins. The stormwater conveyance system is illustrated in Figure 1-3.

2.0 REMEDIAL ACTION

2.1 COMMON REMEDIAL METHODOLOGIES

Several sampling methodologies and standard operating procedures were common to the investigation and remediation of all seven identified remediation areas. Each of these methodologies are discussed in the following sections.

2.1.1 X-Ray Fluorescence Analysis

On-site soil sampling and X-Ray Fluorescence (XRF) analysis activities began on November 16, 1998. XRF analysis was performed using a Spectrace 9000 energy dispersive XRF instrument. XRF analysis practices were performed in accordance with the approved sampling and analysis plan (Montgomery Watson, 1998), which included a pre-mobilization correlation study, on-site XRF sample handling procedures and daily calibrations.

2.1.1.1 Correlation Study

On October 20, 1998, ENTACT collected five soil samples from various locations throughout the JCBGI Facility where known contamination was present. Each sample was analyzed for total lead three times using the on-site XRF instrument, and at Core Laboratories using SW-486 Method 6010A. XRF and laboratory analytical results for the correlation study samples are summarized in Table 2-1. The data were utilized to determine an equivalent XRF total lead action level to meet clean up action objectives set forth by USEPA Region 3. The average percent difference between the XRF data and the fixed lab data was appraised. Subsequent XRF results were forwarded to Montgomery Watson where a correlated clean up level of 314 ppm lead was established. The analytical data packages for the correlation study are included in Appendix C-1.

2.1.1.2 On-Site Laboratory Procedures

A temporary on-site XRF laboratory was constructed inside the JCBGI facility. The immediate area surrounding the laboratory was draped in 6 millimeter polyethylene sheeting to segregate the laboratory equipment and samples from fugitive dust particles within the facility building. All soil samples used for

screening were collected and stabilized with material in the treatment container.

All delineation and confirmatory soil samples analyzed by the on-site XRF laboratory were prepared using the following methodology. The samples were first dried in a microwave oven, then processed through an ASTM #4 sieve. Once the sample had been sieved and dried, it was ground to a fine powder-like consistency using a decontaminated mortar and pestle. A portion of the sample was then transferred to an XRF sample cup. Three lead concentration readings were taken for each sample analyzed and the average result was used for comparison to the XRF action level.

2.1.1.3 Calibration

In accordance with Standard Operating Procedures (Final Remediation Work Plan, Appendix A, September, 1998), the XRF unit was calibrated daily to ensure optimum performance. An energy calibration was performed every morning prior to sampling activities. Teflon and iron standards were analyzed to monitor drift and measure the presence of contamination on the detector window. A site-specific standard was analyzed in triplicate and the results averaged to measure accuracy prior to initial daily analysis and after each 10 concurrent readings. If results indicated a value greater than a 20 percent variance of the site specific standard, another energy calibration was performed. The process was repeated until the results showed a less than 20 percent difference from the site-specific standard.

2.1.2 Sample Identification

Each soil or water sample collected during the remedial action was assigned a unique alphanumeric code that identified each sample by remedial area, sample matrix, and if applicable, location, and depth. Representative sample identification codes with examples are illustrated in Table 2-2.

2.1.3 Delineation Sampling

The lateral and vertical extent of unpaved soils containing lead at concentrations in excess of the remedial action objectives was delineated at remediation areas A, B, D, and E prior to the initiation of excavation. Area C, which is bound on all four sides by concrete or asphalt constraints, was vertically delineated during soil excavation using confirmatory sampling methods. No soil samples were collected at Area F because it was entirely paved.

Delineation samples were collected with a stainless steel direct push sampling tool equipped with a stainless steel sample barrel and a disposable acetate sample liner. The sampling tool was manually advanced to the required sample depth and the sample was collected. The sample tool was extracted, opened, and the sample liner containing the soil sample removed. The sample and the liner was then transported to the on-site laboratory for analysis. The sample liner was cut and the soil sample removed from the liner immediately prior to processing.

2.1.4 Confirmatory Sampling

Confirmatory samples were collected with either a stainless steel hand trowel or plastic disposable hand trowel. Samples were immediately transported to the on-site XRF laboratory and prepared for XRF analysis.

Ten percent of the collected confirmatory samples were split for replicate analysis at the on-site laboratory and by an off-site analytical laboratory as part of the Quality Assurance/Quality Control procedure for confirmatory samples. All off-site analytical samples were collected, homogenized, and transferred into a laboratory-provided sample jar prior to being placed on ice in a cooler in preparation for over night delivery to Pace Analytical Services Inc. (Pace) of Indianapolis, Indiana. The off-site analytical sample tracking log has been presented as Table 2-4. At the end of each sampling day, the chain of custody forms were completed and sealed inside each cooler prior to shipment. Copies of each submitted Chain of Custody are included with the laboratory analytical packages in Appendix C.

2.1.5 Sample Tool Decontamination

Any reusable sampling and laboratory processing tools used during remedial activities were decontaminated using a diluted Alconox solution, followed by a de-ionized rinse, a one percent nitric acid wash, and another de-ionized water rinse. Sample technicians donned a new pair of nitrile gloves in preparation for each sample point to minimize the potential for cross-contamination. The decontamination liquids were disposed of in JCBGI's permitted wastewater treatment plant, where the liquids were processed in accordance with the facilities existing permit.

2.1.6 Field Documentation

Field activities were documented on a daily basis during remedial activities at the site. Field documentation included a project journal, sampling team field log notes, and health & safety meeting notes. All field documentation has been included as Appendix A. Photodocumentation of site activities has been included as Appendix D.

2.1.7 Field Quality Assurance/Quality Control

The XRF unit was calibrated on a daily basis in accordance with Standard Operating Procedures outlined in Final Remediation Work Plan (Appendix A, September, 1998) to the workplan. An energy calibration was performed every morning prior to sampling activities. Teflon and iron standards were analyzed to monitor drift and measure the presence of contamination on the detector window. Daily energy calibration runs using iron and Teflon blanks were recorded on the XRF data logger (Appendix B). The site-specific standard was analyzed in triplicate prior to initial daily analysis and after each 10 concurrent readings. If results indicated a value greater than a 20 percent variance of the site specific standard, another energy calibration was performed. The process was repeated until the results showed a less than 20 percent difference from the site-specific standard.

Field quality control (QC) samples included the collection of split samples for Pace Analytical Laboratory to perform analysis at select locations to verify the XRF results (confirmatory laboratory duplicates). The sample results are indicated in red in Figures 2-1, 2-2, 2-3, 2-5, and 2-7, and summarized in Table 2-4.

Field duplicates were also collected to provide a check on the ability of the laboratory to replicate its analytical results. The samples were collected at a rate of one for every ten laboratory samples collected in each Remediation Area and for each sample matrix including site soils, stockpiled untreated soils and stockpiled treated soils in accordance with the Workplan. A comparison of the laboratory investigative sample results and the associated field duplicate sample results is provided in Table 2-A.

Table 2-A: Field Duplicate Results.

Sample Location	Off-Site Laboratory Sample Result	Field Duplicate Results
CSA-B3-12	9.4 mg/Kg	9.8 mg/Kg
CSE-B2-8	120 mg/Kg	120 mg/Kg
CSD2-B3-8	8.7 mg/Kg	14 mg/Kg
CSD2-C8-8	44 mg/Kg	55 mg/Kg
CSD2-C14-W6	7.7 mg/Kg	37 mg/Kg
SPSB-01T	<0.50 mg/L	<0.50 mg/L
SPSD2/E-02	<0.50 mg/L	<0.50 mg/L

Equipment blanks were not necessary since disposable sampling equipment was used for the sample collection.

Laboratory QC Summary Reports were prepared by Pace Analytical, Indianapolis, Indiana for the soil confirmation samples, backfill and waste soil characterization samples received between December 2, 1998 and January 13, 1999. The reports, presented in Appendix C indicate that all analytical procedures were performed in accordance with the Pace Analytical Standard Operating Procedures based on the methods referred to in the reports.

Case narratives are provided for each analytical report outlining the matrix spike/matrix spike duplicate recoveries, method blanks, initial calibration and continuing calibration standards, and Laboratory Control Sample results. Based on a review of these narratives, the samples were analyzed within required holding times and the analytical data is within acceptable limits, as indicated in Attachment C of this Addendum, with the exception of a few samples that showed low matrix spike recoveries for some metals. These metals included arsenic, antimony and selenium. The off-site laboratory data was of known and acceptable quality as qualified based on the laboratory established acceptance limits.

2.2 AREA A: SOUTHWESTERN CORNER OF THE SITE

2.2.1 Delineation

Area A is triangular in shape and bounded by physical/property constraints to the south and east (rail spur/pavement), and west (Conrail). The northern side of Area A opens up to the JCBGI property. Two delineation samples (SSA-SS13-6 and SSA-SS13-12) were collected from a point on the north side of Area A, just north of the 1997 RFI boring location SS-13 (Refer to Figure 1-2 for the location of SS-13). The delineation samples were collected at discrete intervals of 6 inches and one foot to verify the extent of contamination. The two delineation sample results, presented in Table 2-3, indicate that total lead was present at 1309 ppm at the 6-inch interval, falling to 93 ppm in the 1-foot interval. Subsequent northward horizontal and vertical delineation was performed concurrent with the excavation and final verification of using XRF readings to ascertain the extent of Area A soils requiring remediation.

2.2.2 Excavation

Remedial activities in Area A are illustrated in photographs 28, 33, 35 and 36 in Appendix D. Excavation of the site soils proceeded incrementally using a Field XRF instrument to guide the direction and depth of digging. No excavation was performed on the Conrail property because access was not obtained. The surface soils were excavated using an excavator to depths ranging from 12 inches in the southern half of the site to 18 inches in the northern portion of the site. Excavated soil was transported to the waste soil accumulation area where it was segregated, treated if necessary and disposed of off-site as nonhazardous waste. Excavation areas were regraded with backfill and top soil from two sources that were previously sampled, analyzed, and verified clean as discussed in Section 2.8 of this report.

2.2.3 Verification

Confirmatory samples were collected for XRF analysis at fifteen excavation floor locations to confirm the vertical extent of contamination, and four sidewall locations to confirm the northward extent of lead contamination, following excavation activities. In accordance with the approved Workplan, off-site laboratory confirmatory samples were collected at a frequency of ten percent (two samples) of the XRF sample locations to verify the accuracy of the XRF results and submitted to Pace Analytical Laboratory for analysis. The results are indicated in red in Figure 2-1, and summarized in Table 2-4. Each excavated floor sample point was positioned in the approximate center of equally spaced grid cells that made up the remediation area, with four additional sidewall samples collected along the northern and eastern excavation boundaries of Area A.

For each XRF confirmatory sample, three separate readings were recorded with the XRF instrument and averaged to obtain the total lead result for that sample location. The complete XRF analytical results are presented in Appendix B. The results of the averaged XRF total lead concentrations ranged from nondetect just outside of the northern excavation boundary to 92 ppm along the western boundary as illustrated in Figure 2-1.

The two confirmatory samples were collected for total lead analysis at CSA-B3-12 and CSA-C5-18 using Method 6010A (Table 2-4). Reported XRF and off-site laboratory analyses total lead concentrations were 92 ppm and 9.4 ppm, respectively for CSA-B3-12 and 17 ppm and 16 ppm, respectively for CSA-C5-18. All of the recorded total lead concentrations were considerably lower than the action level, indicating that the contaminated soils had been successfully removed in Area A

2.3 AREA B: DOWNSPOUT LOCATIONS - SOUTH SIDE OF MAIN BUILDING

2.3.1 Delineation

Four vertical delineation samples were collected at a uniform depth of 1.5 feet below grade at four locations in Area B. No horizontal delineation was performed because Area B is bounded on all four sides by physical constraints. Delineation sample points were taken between the railroad ties of the rail spur running through the site. Total lead XRF results (Table 2-3) for the delineation samples exceeded the action level at two locations in the Site area. Because these exceedences were present below the rail spur, the rail spur was removed and underlying soils excavated prior to completing vertical delineation of total lead concentrations in the area soils (Refer to Section 2.11.2). The maximum vertical extent of area soil contamination was determined as part of confirmatory sampling.

2.3.2 Excavation

Remedial activities at Area B are illustrated in photographs 31-34, 39-44, 49 and 50 in Appendix D. As part of the soil remedial effort in the area, the railroad tracks, ties, and subgrade material were removed prior to excavation. Excavation of the site soils proceeded incrementally using a Field XRF instrument to guide the direction and depth of digging. The surface soils were excavated using a mini excavator to depths ranging from 36 inches west of the outfall of the downspout, to 42 inches below grade at the outfall. Excavated soils and railway materials were transported to the waste soil accumulation area where they were segregated and taken off-site for disposal.

2.3.3 Verification

Confirmatory samples were collected at six locations after completion of the Area B excavation. Sample points were positioned in the center of each equally spaced grid cell that made up the remediation area. The results of the averaged XRF total lead concentrations ranged from nondetect at the western end, to 55 ppm at the east end of the excavation (Figure 2-2). One confirmatory sample, CSB-C1-42, was collected for total lead analysis to be performed by Pace Analytical Laboratory using Method 6010A (Table 2-4). The averaged XRF results and off-site confirmatory concentrations for total lead were 53 ppm and 3.8 ppm, respectively. All of the recorded total lead concentrations were considerably lower than the action level, indicating that the contaminated soils had been successfully removed.

2.4 AREA C: DOWNSPOUT LOCATIONS - SOUTHEAST CORNER OF MAIN BUILDING

2.4.1 Delineation

Area C is a relatively small area, bounded on all sides by exterior building walls or concrete and asphalt paving. Therefore, horizontal delineation was not performed as part of the remedial action. Due to the limited areal extent of site, no pre-excavation vertical delineation samples were collected at Area C. The vertical extent of Area C was delineated during the excavation of the soils within the area using real-time XRF sampling to determine the vertical depth of contamination.

2.4.2 Excavation

Remedial activities at Area C are illustrated in photographs 55 through 59 in Appendix D. Excavation of the site soils proceeded incrementally using a Field XRF instrument to guide the direction and depth of digging. The area surface soils were excavated using a mini excavator to depths ranging from 6 inches below grade on the north side of Area C, to 38 inches below grade near a downspout at the northeast corner of the waste water treatment area. Excavated soils were transported to the waste soil accumulation area where they were segregated and taken off-site for disposal.

2.4.3 Verification

Confirmatory samples were collected for XRF analysis at six excavation floor locations and one sidewall location (north sidewall) after completion of the Area C excavation. The sidewall sample was collected to confirm the lateral extent of contamination along the north side of Area C that is bounded by grass. Each sample point was positioned in the center of six equally spaced grid cells. XRF confirmatory sample locations and the associated averaged total lead concentration results at Area C are illustrated in Figure 2-3 and summarized in Table 2-3. XRF total lead concentrations ranged from nondetect at grid cell A5, to 98 ppm at side wall sample CSC-A6-W6 (Figure 2-2). One confirmatory sample, CSC-A1-32, was collected for total lead analysis to be performed by Pace Analytical Laboratory using Method 6010A (Table 2-4). The averaged XRF results and off-site confirmatory concentrations for total lead were 35 ppm and 56 ppm, respectively. All of the measured total lead concentrations were considerably lower than the remedial action level, indicating that the contaminated soils had been successfully removed.

2.5 AREA D: SOFT SHOULDER ALONG NORTH BROAD STREET

2.5.1 Delineation

Forty samples were collected for XRF analysis at twenty-four locations in Area D to complete delineation of the horizontal and vertical extent of lead contamination. No vertical delineation was required in the D1 area because 1997 RFI analytical results established that the extent of contamination did not extend beyond a depth of six inches below grade.

Horizontal and vertical delineation in the D2 subarea was performed at six-inch intervals at each of the sample grid points identified in Figure 2-4.

Delineation samples were collected at the six-inch and 12-inch intervals from evenly spaced, 80 feet by 20 feet grid cells in both subareas D1 and D2. Sample locations are illustrated in Figure 2-4. The sample results, presented in Table 2-3, indicate that total lead was present at concentrations ranging from 69 ppm to 7,460 ppm at the 6-inch interval, and 72 ppm to 8,558 ppm at the 12-inch interval. The highest concentrations were detected in samples SSD2-A3-NE6 and SSD2-A4NE12 located along the eastern boundary of Area D2 adjacent to Broad Street.

During the D1 area delineation sampling, sample point SSD1-A1-SE showed a lead concentration of 936 ppm at 6 inches and 345 ppm at 12 inches. No further vertical delineation was performed at this location.

Delineation results indicated that total lead concentrations in the D area soils generally decreased significantly between the 6-inch and the 12-inch depth sample intervals. The marked decrease with depth in the D area, as well as at the other remediation areas, suggests that the source of lead was deposited at the surface, and that the migration of lead is strongly attenuated with increasing depth. The exception to this general depth-wise decrease in total lead concentrations occurred at delineation sample point SSD2-A3NE, where the measured total lead levels increased an order of magnitude between the 6-inch and 12-inch sample intervals. While excavating the soils in the immediate vicinity of SSD2-A3NE, a 12-inch corrugated steel storm sewer pipe (designated as "Leg 4" on Figure 1-3 of the Report) was encountered at six inches below ground surface. The pipe was found to be in poor condition. The storm sewer was removed and replaced with an equivalent diameter ADS plastic pipe.

A separate section of abandoned 4-inch plastic pipe was encountered in the western D2 area at six inches below ground surface. The pipe line ran parallel to the storm sewer pipe for approximately 25 feet and then angled off at an approximate 45 degree angle and ran north for approximately 90 feet where it terminated. Upon review of facility historical records, the line is likely an abandoned section of a former process sewer that discharged to the POTW. The pipe was observed to be in good condition. Figure 2-4 illustrates the location of the 4-inch line. This 4-inch line was found to contain a white precipitate believed to be lead oxide residue. However, the residue was present inside the pipe, not in the surrounding soils.

2.5.2 Excavation

Remedial activities at Area D are illustrated in photographs 22, 47, 51 through 53, and 61 through 64 in Appendix D. Excavation of the site soils proceeded incrementally using a field XRF instrument to guide the direction and depth of digging. The surface soils were excavated using a tracked excavator to depths ranging from 6 inches along the eastern and southern boundaries to 12 inches along Broad Street. Excavated soils were transported to the waste soil accumulation area where it was segregated, treated as necessary, and disposed of off-site at an approved landfill as nonhazardous waste.

Impacted soils surrounding the steel drainage pipe were excavated using real time XRF measurements to determine the lateral and vertical extent of lead contamination along the pipe run. Soils underlying the pipe run were excavated up to a depth of 18 to 24 inches below grade based on field XRF results. After excavation, the pipe segment within the Area D remediation area was replaced with 12-inch diameter ADS flex pipe (Refer to Section 2.11.1).

2.5.3 Verification

Confirmatory sample locations for Area D1 were collected for XRF analysis from two excavated floor locations and one sidewall location along the southern boundary with the results summarized in Table 2-3 and illustrated in Figure 2-5. The averaged XRF results ranged from 67 ppm to 86 ppm, below the action level of 314 ppm. At sample location CSD1-B1-6, a sample was also collected for total lead analysis at Pace Analytical Laboratories to verify the accuracy of the XRF results (Table 2-4). The total lead results of the XRF analysis and the laboratory analysis were 67 ppm and 65 ppm, respectively.

As discussed in Section 2.5.1, a D1 area delineation sample collected at the 12-inch interval of sample point SSD1-A1-SE that exhibited a total lead concentration of 345 ppm at 12 inches, a value within 10 percent of the 314 ppm action level. The subsequent confirmatory sample in this grid cell at a depth of 8 inches yielded a total lead concentration of 86 ppm, indicating that the surficial lead contamination had been excavated. Additionally, the 1997 RFI sampling results indicated that the vertical extent of lead contamination in the D1 area did not extend below a depth of six inches. Therefore, there was no vertical delineation requirement outlined in the approved workplan (Montgomery Watson, 1998).

All of the recorded total lead concentrations from the confirmation sampling were lower than the remedial action level. Therefore, the contaminated soils delineated in Area D1 are considered to have been successfully removed.

For Area D2, 62 confirmation samples were collected from the excavation floor in the approximate center of each of the equally spaced grid cells that made up Area D2. An additional eight confirmation samples were collected from the sidewalls along the western wall of the excavation area that was not bounded by physical constraints. The sample locations and results are illustrated in Figure 2-5. XRF averaged results indicated that total lead concentrations in the confirmatory samples ranged from 11 ppm to 183 ppm at excavated depths ranging from 6 inches to 12 inches as summarized in Table 2-3. Eight XRF confirmation samples were split for submittal to Pace Analytical Laboratory for total lead analysis using Method 6010A. These analytical results are identified red in Figure 2-5, and summarized in Table 2-4. The results from Pace Analytical Laboratory also confirm that the area has been remediated to levels below cleanup criteria. All XRF and off-

site laboratory total lead results of the confirmatory samples were considerably lower than the action level, indicating that the contaminated soils had been successfully removed in Area D2

2.6 AREA E: DOWNSPOUT LOCATION - NORTHEAST CORNER OF THE MAIN BUILDING

2.6.1 Delineation

Area E is a relatively small area, bounded by pavement on the north and the exterior building wall on the south. Delineation sampling consisted of the collection of six samples collected a radius of 10 to 30 feet from the roof drain off the northeastern corner of the main building as illustrated in Figure 2-6. The samples were analyzed for total lead by XRF analysis with results ranging between 264 to 860 ppm as summarized in Table 2-3. The horizontal extent of contamination was not completely delineated on the west side of Area E during the delineation phase of the remedial action. Real-time XRF performed during the excavation of the area soils was used to complete the delineation of lead above action levels. No vertical delineation samples were collected at Area E in accordance with the workplan.

2.6.2 Excavation

Remedial activities at Area E are illustrated in photographs 45, 46 and 54 in Appendix D. Excavation of the site soils proceeded incrementally using a Field XRF instrument to guide the direction and depth of digging. The surface soils were excavated using a mini excavator to a depths ranging from 6 inches along the east and west boundaries of the excavation to 12 inches near the roof drain area. Excavated soils were transported to the waste soil accumulation area where it was segregated, treated as necessary, and disposed of off-site at an approved landfill as nonhazardous waste.

2.6.3 Verification

Confirmatory sample locations were collected for XRF analysis at four excavation floor locations and four sidewall locations (two east sidewall and two west sidewall) after completion of the Area E excavation. The sidewall samples were collected to confirm the lateral extent of contamination along the east and west sides of Area E. Each excavation floor sample point was positioned in the center of four equally spaced grid cells and the side wall samples were collected approximately 6 inches from the top of the wall. Confirmation sample locations and the associated averaged XRF total lead concentration results at Area E are illustrated in Figure 2-7 and summarized in Table 2-3.

XRF total lead concentrations ranged from 18 ppm in the western sidewall sample to 138 ppm at grid cell B2 (Figure 2-7). One sample, CSE-B2-8, was also submitted to Pace Analytical Laboratory for analysis of total lead (Table 2-4). The XRF and the laboratory results for the sample were 138 ppm and 120 ppm, respectively.

In the area where lead was detected at 776 ppm during delineation sampling, soils were excavated to a depth of 8 inches and confirmation sample results indicate that the lead concentrations were 126 ppm. Side wall samples, collected along the east and west sides of the excavation where no physical constraints are present, exhibited lead concentrations no greater than 60 ppm. All of the recorded total lead concentrations were considerably lower than the remedial action level, indicating that the contaminated soils had been successfully removed.

2.7 AREA F: SURFACE DEPOSITS - SOUTHEAST CORNER OF FORMER SALVAGE MELT BUILDING

This area consists of a narrow, 2.5 feet-wide by 20 feet-long strip of paved surface where sediment had accumulated over time (Figure 1-2). Photographs 29 and 30 of Appendix D illustrate the Area F remediation area. Sediment had accumulated at the junction of the pavement and the adjacent building foundation. No delineation or verification sampling was performed in this area because it is underlain by pavement. Due to the narrow area of concern, push brooms and shovels were used to remove surface deposits. Hand tool efforts removed accumulated sediment to a three inch depth. The material was removed from the area, stabilized in the on-site treatment container, transported and disposed of with other treated soils. A hot asphalt cap was requested by JCBGI to eliminate possible "ponding" effects resulting from rain accumulation. Asphalt operations were completed on November 25, 1998.

2.8 EXCAVATED SOIL/SEDIMENT TREATMENT AND DISPOSAL

2.8.1 Segregation

Site soils excavated as part of the remedial action were analyzed for total lead and subsequently segregated to ensure proper off-site disposal. Field XRF analysis was utilized to segregate excavated soils requiring stabilization prior to off site transport and disposal. During segregation, excavated materials exhibiting XRF total lead levels equal to or greater than the established clean up level of 314 ppm but less than 1000 ppm were stockpiled on polyethylene sheeting in the staging area. The stockpiled soil (both treated and untreated) was sampled for TCLP lead analysis at a rate of approximately 1 sample per 100 cubic yards of soil. Soil stockpile data are summarized in Table 2-5 and contained in Appendix C. After completion of remedial activities,

approximately 700 cubic yards of material exhibiting XRF total lead concentrations between 314 ppm and 1000 ppm were stockpiled.

Excavated materials exhibiting XRF total lead concentrations greater than 1000 ppm were placed directly in the treatment container for stabilization treatment. After completion of remedial activities, approximately 500 cubic yards of excavated material exhibiting XRF total lead concentrations in excess of 1000 ppm were segregated and treated on-site.

2.8.2 Treatment

As identified in the Final Remedial Action Work Plan, excavated soils containing elevated levels of lead would be treated on-site to levels below the 5.0 mg/L by TCLP for lead prior to off-site disposal at a Subtitle D Landfill. To establish the appropriate treatment approach, ENTACT performed a treatability study on a representative sample of the impacted site soils to determine the appropriate additive type(s) and soil to additive ratio prior to site mobilization. The analysis was performed by Core Laboratory and the results of the treatability study have been included in Appendix F.

An on-site treatment container was constructed to receive soil and sediment requiring stabilization prior to off-site disposal. The treatment container was constructed with "Jersey" barriers as retaining walls consisting of 34" x 12' concrete beams. Three individual contiguous layers of 10-millimeter polyethylene were used to line the interior of the containment area which was located on an asphalt pad devoid of cracks. Narrow open spaces between and below barrier sections were closed with sealing foam and sand bags. A mobile dust suppression system was completed around the treatment area perimeter for emissions control during stabilization operations. When inactive, the treatment area was enclosed by a tarp to prevent rainwater accumulation and eliminate potential air emissions during periods of high winds. The multiple 10-millimeter polyethylene layers were removed and disposed of at BFI, Conestoga Landfill after each treatment series was completed. The treatment container was then re-lined. Photographs 23 through 27 of Appendix D illustrate the construction of the on-site treatment container.

The excavated soils exhibiting total lead concentrations in excess of 1000 ppm were stabilized to non-hazardous levels by combining the impacted material with chemical additives in a process that reduces leachable lead concentrations through a chemical fixation/stabilization process. The treatment additive(s) react(s) with the lead ions within the soil material matrix to create stable compounds that are relatively

insoluble, thereby reducing the potential leaching and subsequent migration of metals through the subsurface.

A track hoe was used to thoroughly mix the segregated Site material with the additives identified during the treatability study. All soils were treated within the constructed treatment container. After mixing, verification samples of each treated batch were collected at a rate of one per every 100 cubic yards and analyzed at Pace Analytical for TCLP lead using Method SW 6010A. Approximately 500 cubic yards of soil exhibiting initial XRF total lead concentrations greater than 1000 ppm were stabilized in the treatment container during the remedial activities. Analytical results for the treated soil verification samples are summarized in Table 2-5.

As indicated by TCLP lead concentrations less than 5.0 mg/L in Table 2-5, treatment of the impacted soils successfully stabilized soil lead concentrations. The treated soils were characterized as nonhazardous and disposed of accordingly.

2.8.3 Off-Site Disposal

Remediation activities resulted in the removal of approximately 1,200 cubic yards of soil, including 500 cubic yards of soil requiring on-site treatment prior to off-site disposal. A summary of the final excavated soil volumes from each area is provided in Table 2-6. Prior to removal of Site soils, a disposal permit was submitted to the receiving landfill, all soils to be moved off-site were verified to be nonhazardous, and the soils manifested for transportation. All soil was disposed of at Browning-Ferris Industries, Conestoga Landfill in Morgantown, Pennsylvania, a Subpart "D" municipal solid waste landfill facility.

2.8.3.1 Permitting

A composite soil sample was collected from areas of known impact and submitted for disposal characterization analysis prior to initiating remedial activities at the Site. An additional composite sample was collected from the Site stormwater basins as part of stormwater basin cleaning/remediation activities performed at the same time as the Site soil remediation activities (ENTACT, 1999). Sediments from the basin closure and the Site soil remediation were disposed of under the same permit. Although only one waste disposal permit was required, the two composite samples were analyzed and results submitted as separate matrixes for one waste stream approval. The soil samples were analyzed for hazardous characteristics, total petroleum hydrocarbons, TCLP RCRA metals, TCLP pesticides and herbicides, TCLP volatile and semivolatile organics, and PCBs (total) (Appendix C). Analytical results from the soil samples were used to characterize the waste prior to mobilization and to complete the required State of Pennsylvania "Form U" permit application for disposal at Browning-Ferris Industries (BFI), Conestoga Landfill located in Morgantown, Pennsylvania.

2.8.3.2 Verification

Preceding loading operations for transportation and disposal, stockpiled and treated soils were sampled at a rate of one sample per every 100 cubic yards and analyzed at Pace Analytical Services for TCLP lead analysis using Method SW 6010A. Samples were collected from both treated material and material not treated but exceeding the site-specific correlated XRF clean-up level of 314 ppm lead. Laboratory results verified that both the untreated and treated soils were nonhazardous. Data results were used in conjunction with waste manifesting to meet disposal documentation criteria. Analytical results for the verification samples are summarized in Table 2-5; associated laboratory reports, including the pre-treatment data from Core Laboratory collected before the treatability study, have been included in Appendix C.

2.8.3.3 Manifesting

Wheeled end loaders were used to transfer the nonhazardous stockpiled and treated soils into 22 ton dump trailers and tri-axle dump trucks for transportation to the BFI Conestoga Landfill. A total of approximately 1200 cubic yards of treated and nontreated soils were disposed of during remedial soil and sedimentation pond activities. All of the soils taken off-site were manifested in accordance with applicable waste manifesting regulations. Soil disposal manifests have been included as Appendix G.

2.9 SITE RESTORATION

Clean fill was used to restore the excavation areas to original grade. Backfill soils used during site restoration were obtained from a commercial barrow pit located in Odessa, Delaware, and a former Sears Lot in Middletown, Delaware. Representative soil samples, designated BF-01 and BF-02, were collected from each source soil prior to using the soil as Site backfill. The soil samples from each backfill source were analyzed for the eight RCRA metals and antimony. Analyzed constituent concentrations in the fill material were well below applicable USEPA Region 3 RBCs, and the 400 ppm remedial action level for lead. Backfill soil analytical results have been included in Appendix C.

Following removal and verification, clean fill was used to restore the excavation areas to its original grade. Areas A and B were compacted using a vibrating drum compactor. Backfill in Area A was topped with a gravel surface. Area B will have an asphalt surface covering when restoration activities commence in the Spring. Backfill material was then distributed in Areas C, D1, D2, and E. During final grading operations,

1 to 2 inches of top grade soil will be applied to provide an adequate seed bed. A hot asphalt cap at Area F was requested by JCBGI to eliminate possible "ponding" effects resulting from rain accumulation.

In the spring, hydroseed will be applied to those unpaved remediated areas in order to restore the vegetation to the original condition. Hydroseed activities have been postponed until the weather will ensure a successful operation.

2.10 ROOF AND STORMWATER CONVEYANCE DECONTAMINATION

2.10.1 Facility Roofs

An inspection of the facility roofs was performed by ENTACT personnel during the week of November 16, 1998. The examination identified visual contamination in several locations. Most prevalent was the roof of the former salvage melt building (Figure 1-3). The former salvage melt building is detached from the main facility and has a low pitched steel roof that collected heavy deposits of lead oxide dust. The heaviest concentrations of lead oxide dust were hand brushed and collected in a High Efficiency Particle Air (HEPA) vacuum.

Emission stacks, I-beams, and various structures located on top of the main facility roof were scrubbed by hand with wire brushes where visual inspection revealed impact. The HEPA vacuum unit was fitted with customized filters so as not to disturb the rough stone finish of the main building roof. All collected material was transferred into a 55-gallon steel drum and stored for future reclamation through JCBGI recycling program. Following vacuum operations, high pressure washing units were hoisted to the roofs to ensure safe and efficient decontamination operations. The roofs, gutters, and downspouts were then power washed. Water from pressure washing procedures was captured at the various downspout discharge sites and consolidated into four, 55-gallon poly drums. Photographs 8 through 21 of Appendix D illustrate roof and conveyance decontamination activities. A composite sample (DW-02) was collected and analyzed for total lead concentrations. Test results indicated the lead concentrations to be within acceptable ranges to be managed at JCBGI's on-site waste water treatment facility. The waste water treatment process precipitates any remaining metals prior to releasing the wastewater into the sanitary sewer system in accordance with JCBGI's discharge permit (Refer to sample number DW-02 in Table 2-4).

2.10.2 Underground Conveyance System Clean-Out

Stormwater pipeline cleaning was initiated following roof decontamination operations during the first week of the project. All catch basins and associated underground piping located throughout the property were methodically cleaned utilizing power jet washing and vacuum unit trucks. Pressure washing activities began at the furthest up-slope portion of the underground conveyance system and progressed toward the basins. Crews utilized a 10,000 pounds per square inch (psi) jet lance followed by the vacuum unit truck to capture all dislodged sediments and rinsate. Sediment, debris, and water collected from each inlet was retained in the vacuum unit truck for sampling. The results from Artesian Laboratory of the water sampled from the vacuum unit can be found in Appendix C and indicated the water contained total lead at a concentration of 1.24 mg/L lead, below hazardous levels (Refer to sample number DW-01 in Table 2-4). Approximately 2,000 gallons of the nonhazardous water from the sewer jet/vac process was discharged into the north sedimentary basin.

Water sampled from the north basin after discharge of the nonhazardous water but prior to discharge to the municipal stormwater system contained total lead at a concentration of 0.044 mg/L (Refer to sample number BW-01 in Table 2-4). This value was well below the Site's discharge limits for lead. The remaining sediments, approximately 6 cubic yards, were transferred into a lined roll-off box on site. The sediment was interspersed with soil materials during the on-site treatment process, sampled, analyzed, and disposed of in a Subtitle D landfill.

2.11 ADDITIONAL FIELD ACTIVITIES

2.11.1 Area D Drainage Pipe Replacement

During the course of excavation operations at remediation Area D2, ENTACT crews encountered a 125-foot long, corrugated steel drainage pipe less than six inches below ground surface. The pipe was identified when a wheel loader collapsed a segment of the pipe during area excavation activities. The pipe ran in a northeast direction from the south guard shack across Area D2 to a junction box along Broad Street and is identified as Leg 4 in Figure 1-3, and in Figures 2-4 and 2-5. The drainage pipe in the D2 area was deteriorated and was replaced in its entirety with a 12-inch diameter ADS high density polyethylene drainage pipe. Drainage pipe replacement activities are illustrated in Photographs 61 and 62 of Appendix D.

All soils beneath and around the pipe exhibiting visual discoloration or field XRF readings above the action level were excavated and included in the on-site treatment activities. The 12-inch pipe was disposed of along with the untreated soil at the BFI Landfill. The final excavated depth of the soils beneath the former drainage

pipe ranged from 12 to 24 inches. Portions of the excavated area along the pipe run were backfilled with clean sand to properly position the replacement drain pipe at the depth of the original corrugated drain pipe.

The 4-inch plastic sewer pipe found in the western portion of Area D2 was removed and cut into small sections, stabilized along with the soil requiring treatment, and disposed of at the BFI Landfill.

2.11.2 Rail Spur Removal

The railroad spur located between the south loading docks and battery storage building in Area B was removed during remediation operations. XRF results contained in Table 2-3 confirmation samples for Area B showed the depth of contamination to extend below the railroad ties. With BFI approval, the railroad ties were removed and disposed of as weathered nonhazardous debris. The steel rails were decontaminated by pressure washing activities. The rails were included in JCBGI's scrap program for metal recycling.

2.11.3 Area B Loading Dock Pressure Washing

Inspection of the loading dock prior to the excavation of Area B soils indicated that portions of the dock were covered in accumulated metal residue. The residue was removed from the loading dock structure by constructing small containment berms at the east and west ends of the loading dock. ENTACT then pressure washed the residue off the dock structure and onto the soils adjacent to the foot of the loading dock wall. The residue and liquid were mixed into the soils, removed and treated as part of Area B excavation/remediation activities discussed in Section 2.3.

2.11.4 Rain Gutter Repair

Prior to the removal of surface residue from the roof of the former Salvage Melt Building adjacent to Area F, ENTACT noted a 1.5-foot by 3 inch-rupture in the rain gutter on the southeast corner of the building. The rain gutter was repaired temporarily by covering the hole with a sized piece of sheet metal, riveted in place, and caulked with sealant. Fifty-five gallon drums were placed below the building downspouts and water was poured down the repaired gutter to ensure that the repair did not leak. No leakage was observed, and the roof decontamination procedures for the building proceeded as described in Section 10.2.1.

The damaged gutter was later replaced by JCBGI after completion of decontamination activities.

3.0 CONCLUSIONS

This report describes the remedial activities performed by ENTACT at JCBGI in response to lead contamination detected in soils in designated remediation areas throughout the site as identified in the Draft Environmental Investigation Report (EIR) dated February 6, 1997. In addition to excavating lead impacted soil, facility roofs, gutters and downspouts were decontaminated to remove the buildup of lead impacted sediments present.

Remedial activities were conducted in accordance with the approved Final Remedial Action Work Plan developed by Montgomery Watson of Malvern, Pennsylvania (1998). Remediation areas at the Site consist of the following:

- Area A: Southwestern Corner of the Site
- Area B: Downspout Locations at the Southern Side of the Main Building
- Area C: Downspout Locations at the Southeastern Corner of the Main Building
- Area D1 & D2: Soft Shoulder along North Broad Street
- Area E: Downspouts at Northeastern Corner of the Main Facility
- Area F: Surface Deposits Adjacent to Southeast Corner of Former Salvage Melt Building

Remedial action strategies were developed for each of the above-mentioned areas based on the extent of known contamination, the size of the area and physical constraints, such as pavement or structures walls present in the area.

The remedial activities in each of the remediation areas followed the same basic procedure of delineation, excavation and verification. Delineation was accomplished with XRF instruments which identified soils that exceeded the action level of 314 mg/Kg lead. Once vertical and horizontal delineation was determined, soils were excavated, stabilized on site if necessary and sent off site for disposal in a nonhazardous Subtitle D landfill. Samples were collected in excavated areas prior to backfilling to verify the clean up objectives had been met.

Facility roofs and other structures were decontaminated when needed as determined by visual inspection. Removal was done with the use of HEPA vacuum units and high pressure washing units. All waste water was collected, sampled and handled through JCBGI's existing waste water treatment plant.

By removing lead-impacted soils in the designated remediation areas, the cleanup objectives for the JCBGI

Facility have been met. The decontamination of lead impacted structures present at the Facility will prevent potential lead contamination in the future.

4.0 REFERENCES

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